STANDARD OPERATING PROCEDURE NO. 2

CONTAINERS, PRESERVATION, HANDLING, AND TRACKING OF SAMPLES FOR ANALYSIS

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3.0 PURPOSE AND SCOPE

The purpose of this document is to define the standard operating procedure (SOP) for containerizing, preserving, handling, tracking, and shipping samples collected as part of the Newark Bay Study Area Remedial Investigation Work Plan (RIWP). Samples may include sediment collected or generated for chemical analysis, radiochemical analysis, and associated quality assurance (QA) analysis. This SOP is intended to be complete enough so that 1) the steps which could affect tracking, documentation, or integrity of samples are explained in sufficient detail and 2) different sampling personnel following these procedures will deliver samples to the laboratory which are equally reliable and consistent, and in compliance with regulatory agency requirements. Specific information regarding sample collection and analysis is found in the IWP.

This SOP may change depending on field conditions, equipment limitations, or limitations imposed by the procedure. Substantive modification to this SOP shall be approved in advance by the Facility Coordinator (FC) (or Alternate FC) and the United States Environmental Protection Agency (USEPA) Remedial Project Manager. The ultimate procedure employed will be documented in the Newark Bay RI Report.

Other SOPs will be utilized with this procedure, including:

- SOP No. 1 – Field Documentation;
- SOP No. 6 – Sediment Collection Using Hand Coring Device;
- SOP No. 7 – Sediment Collection Using Vibracoring Device;
- SOP No. 8 – Core Processing;
- SOP No. 9 – Management and Disposal of Residuals; and
- SOP No. 10 – Sediment Collection Using Grab Sampling Device.

4.0 PROCEDURES

4.1 EQUIPMENT LIST

The following equipment list contains materials which may be needed in carrying out the procedures contained in this SOP. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions.

- personal protective equipment (PPE) and other safety equipment, as required by RIWP Volume 3 (Tierra, 2005);
- inert packing material (e.g., foam peanuts, vermiculite, cardboard, etc.);
- colorimetric pH test paper;
- nitric acid (HNO_3) and pipette;
- sample containers as specified in Tables 6-6 and 6-7 of the IWP;
- sample labels;
- chain of custody;
- Sample Delivery Group (SDG) Tracking Logs;
- ice chest(s);
- custody seals;
- indelible marking pens;
- shipping tape;
- sealable plastic bags;
- temperature blanks (if not provided by the laboratory);
- logbook;
- ice or similar chilling source;
- potassium iodide starch paper;
- spatula;
- sodium hydroxide (NaOH) and pipette;
- plastic lining material; and
- clear tape.

4.2 SAMPLE IDENTIFICATION AND LABELING

4.2.1 SAMPLE IDENTIFICATION CODE

The standard sample identification number will consist of a unique 13 character string used to identify each sample collected and submitted to the laboratories for analysis, as follows:

Characters 1 and 2: Two characters to describe the waterbody where the sample was collected. For the Phase I SI Program, this will be "NB" for Newark Bay or "HR" for Hackensack River.

Characters 3 and 4: Two digits to describe the phase during which the sample was collected. For example, the Phase I SI Program will be described as "01".

Characters 5, 6, and 7: Three characters to describe the sample matrix. For the Phase I SI Program, this will be "SED" for sediment. Duplicate samples will be identified in a logbook and transferred to the database.

Characters 8, 9, and 10: A three digit number to describe the sample collection location (sequentially numbered from 001 to 999).

Character 11: A character which describes the sequence of cores or grabs collected at this location (A, B, C…).

Character 12 and 13: A two digit number (preceded by a hyphen) to describe the sample collected at that location, sequentially numbered from 01 to 99, beginning at the top of the core and proceeding down.

<u>Location Identifier</u>

Location IDs are pre-assigned and are found on Table 6-3 of the IWP. The location ID and location information (coordinates) will be recorded on the Individual Core Collection Form, the Core Lithology/Description Form, and the Sample Processing Form (see SOP No. 1 – Field Documentation).

Sample Identifier

The sample identifier is represented by Characters 12 and 13. For sediment samples collected from cores, the first interval to be sampled for chemical analyses, starting from the top of the core, will be assigned a sample number 01, and each subsequent interval sampled, with increasing depth, will be assigned the next higher sequential sample number (e.g., 02, 03, etc.)

Example of Sample Identification Code

Following is an example of a sediment core segment identification number:

NB01SED030B-02

Explanations:

- The sample was collected in Newark Bay during the Phase I SI Program and was a sediment sample.
- The sample was collected at Location 30 from the second core at that location.
- The sample represents the second interval sampled for analysis, referenced to the top of the core.

4.2.2 SAMPLE DELIVERY GROUP (SDG) NUMBER IDENTIFICATION CODE

The standard SDG Number will consist of a unique six character string used to identify each SDG submitted to the laboratories for analysis, as follows:

Characters 1 and 2:	Two characters to describe the water body where the samples were collected. For the Phase I SI Program, this will be "NB" for Newark Bay.
Character 3:	One digit to describe the phase during which the sample was collected. For example, the Phase I SI Program will be described as "1".
Characters 4 through 6:	A three digit number to describe the SDG, sequentially numbered beginning with 001, up to 999.

Following is an example of a SDG Number:

NB1003

Explanation:

The samples in this SDG were collected from Newark Bay during the Phase I SI Program. The SDG was the third SDG submitted to the laboratory for analysis.

4.2.3 QUALITY ASSURANCE SAMPLE IDENTIFICATION CODE

Rinsate blank samples will be labeled by a unique eight character string. The first six characters will be the SDG Number that the rinsate blank is being submitted with. The last two characters will be "RB" for rinsate blank.

Following is an example of a SDG Number:

NB1003RB

Explanation:

This rinsate blank was submitted along with samples collected from Newark Bay during the Phase I SI Program with the third SDG.

4.2.4 SAMPLE LABELING

A label will be attached to each bottle used for sampling. An example of a preprinted sample label is attached to this SOP. When practical, the project number, sample matrix, laboratory designation, and sample identification code will be typed or printed onto the label before sampling. Once affixed to the sample container, the label will be protected from water and solvents with clear packing tape.

4.3 SAMPLE CONTAINERS AND PRESERVATION

4.3.1 SAMPLE CONTAINERS

To ensure that the appropriate sample quantities are collected in certified, pre-cleaned containers, sample containers for this project will be supplied from commercial suppliers or laboratories. Sample containers will be cleaned to the quality control standard defined in USEPA Office of Solid Waste and Emergency Response (OSWER) Directive #9240.0-05A. Certification of sample container quality per the OSWER directive will be kept in the Newark Bay Central Project File. Tables 6-6 and 6-7 of the IWP summarize container types which will be provided for samples collected.

4.3.2 SAMPLE PRESERVATION

The contracted laboratory performing the analysis will provide certified, pre-cleaned containers containing a pre-determined amount of the required preservative(s) for rinsate blanks, as appropriate. In cases where field adjustment of pH is necessary, the procedures outlined below will be followed for the appropriate analysis. Sample containers for sediment will not contain preservatives.

The rinsate blank sample containers will be pre-preserved by the laboratory. The specific preservatives to be used for each chemical analysis are summarized in Tables 6-6 and 6-7 of the IWP. Documentation of equipment and methods used in preservation, and field-adjustment of pH will be maintained in a logbook. The chemicals and amounts used will be recorded. If refrigeration is necessary, samples will be placed on ice after collection, and shipping containers will be packed with additional ice, if needed, prior to shipment via overnight carrier.

4.3.2.1 pH FOR RINSATE BLANKS FOR CYANIDE ANALYSIS

Aqueous rinsate blank sample bottles for cyanide analysis will be pre-preserved with NaOH. Immediately following sample collection, the pH of the preserved sample will be determined and adjusted, if necessary, using the following procedure:

1. Close the bottle and gently invert it several times to mix the preservative with the sample.

2. Pour a small aliquot (a few drops) of the sample into a separate vial.

3. Test the aliquot in the vial with colorimetric pH paper appropriate to the pH being tested. If the pH of the sample is less than 12, increase the pH of the rinsate blank by adding 50% NaOH. Using a pipette, add 0.2 ml (4 to 5 drops) of NaOH to the sample.

4. Close the bottle and gently invert it several times to mix the preservative with the sample.

5. Pour a small aliquot (a few drops) of the sample into a separate vial.

6. Repeat this process until the correct pH (greater than 12) is achieved. The aliquots used for testing the pH will be disposed in accordance with SOP No. 9 – Management and Disposal of Residuals. The amount, type, and procedures will be documented in the logbook in accordance with SOP No. 1 – Field Documentation.

4.3.2.2 pH FOR RINSATE BLANKS FOR METALS ANALYSIS

Aqueous rinsate blank sample bottles for metals analysis will be preserved with HNO_3. Immediately following sample collection, the pH of the preserved sample will be determined and adjusted, if necessary, using the following procedure:

1. Close the bottle and gently invert it several times to mix the preservative with the sample.

2. Pour a small aliquot (a few drops) of the sample into a separate vial.

3. Test the aliquot in the vial with colorimetric pH paper appropriate to the pH being tested. If the pH of the sample is greater than 2, lower the pH of the rinsate blank by adding HNO_3. Using a pipette add 0.2 ml (4 to 5 drops) of HNO_3 to the sample.

4. Close the bottle and gently invert it several times to mix the preservative with the sample.

5. Pour a small aliquot (a few drops) of the sample into a separate vial.

6. Repeat this process until the correct pH (less than 2) is achieved.

The separate aliquots used for testing the pH will be disposed in accordance with SOP No. 9 – Management and Disposal of Residuals. The amount, type, and procedures will be documented in the logbook in accordance with SOP No. 1 – Field Documentation.

4.3.2.3 pH FOR RINSATE BLANKS FOR TOC ANALYSIS

Aqueous rinsate blank sample bottles for TOC analysis will be preserved with H_2SO_4. Immediately following sample collection, the pH of the preserved sample will be determined and adjusted, if necessary, using the following procedure:

1. Close the bottle and gently invert it several times to mix the preservative with the sample.

2. Pour a small aliquot (a few drops) of the sample into a separate vial.

3. Test the aliquot in the vial with colorimetric pH paper appropriate to the pH being tested. If the pH of the sample is greater than 2, lower the pH of the rinsate blank by adding H_2SO_4. Using a pipette add 0.2 ml (4 to 5 drops) of H_2SO_4 to the sample.

4. Close the bottle and gently invert it several times to mix the preservative with the sample.

5. Pour a small aliquot (a few drops) of the sample into a separate vial.

6. Repeat this process until the correct pH (less than 2) is achieved.

The separate aliquots used for testing the pH will be disposed in accordance with SOP No. 9 – Management and Disposal of Residuals. The amount, type, and procedures will be documented in the logbook in accordance with SOP No. 1 – Field Documentation.

4.3.2.4 pH FOR RINSATE BLANKS FOR TEPH ANALYSIS

Aqueous rinsate blank sample bottles for TEPH analysis will be preserved with HCl. Immediately following sample collection, the pH of the preserved sample will be determined and adjusted, if necessary, using the following procedure:

1. Close the bottle and gently invert it several times to mix the preservative with the sample.

2. Pour a small aliquot (a few drops) of the sample into a separate vial.

3. Test the aliquot in the vial with colorimetric pH paper appropriate to the pH being tested. If the pH of the sample is greater than 2, lower the pH of the rinsate blank by adding HCl. Using a pipette add 0.2 ml (4 to 5 drops) of HCl to the sample.

4. Close the bottle and gently invert it several times to mix the preservative with the sample.

5. Pour a small aliquot (a few drops) of the sample into a separate vial.

6. Repeat this process until the correct pH (less than 2) is achieved.

The separate aliquots used for testing the pH will be disposed in accordance with SOP No. 9 – Management and Disposal of Residuals. The amount, type, and procedures will be documented in the logbook in accordance with SOP No. 1 – Field Documentation.

4.3.2.5 PREPARATION OF pH FOR RINSATE BLANKS FOR VOC ANALYSIS

Aqueous rinsate blank sample bottles for VOC analysis will be pre-preserved with sufficient HCl to lower the rinsate blank below a pH of 2. Rinsate blanks for VOC analyses will be prepared using the following procedure:

1. Slowly pour rinsate blank into pre-prepared VOC vial until a meniscus is formed on the top of the vial.

2. Carefully cap the VOC vial and gently invert the vial to check for air bubbles.

3. Repeat process until no air bubbles are present. Dispose of VOC samples with air bubbles in accordance with SOP No. 9 – Management and Disposal of Residuals.

4.4 SAMPLE HANDLING AND SHIPPING

Sample packaging and shipping will be done in accordance with applicable regulations, as described below.

1. After filling a sample container, affix cap and securely seal with clear tape (except for samples to be analyzed for VOCs) and complete the sample label. Apply the label to the sample container and cover with clear tape.

2. Clean the outside of each sample container by wiping it off with a clean paper towel. Verify that residual sediment has been removed from the outside of the container, and from the area under and around the cap.

3. Seal each sample container inside a sealable plastic bag. Samples for VOC analysis will be packaged together in a sealed plastic bag.

4. Place samples on ice or similar chilling source immediately after collection.

5. Transfer the samples to a plastic-lined ice chest which will be used as a shipping container. Use inert packaging material (e.g., cardboard, vermiculite, etc.) to cushion the samples and minimize the potential for breakage. Seal the drains on the ice chest (if present) with shipping tape or plug the drains with silicone sealant or a similar inert substance.

6. Ice chests will contain ice or similar chilling sources sufficient to maintain a temperature of 4° Celsius (°C) inside the cooler during transport. Use sufficient ice to accommodate reasonable delays in shipment. A temperature blank provided by the analytical laboratory with each cooler will be included in the shipment.

7. Complete sample tracking documentation as described in Section 4.5 of this SOP, and place the documents in a sealable plastic bag inside the ice chest, taped to the inside of the lid. Prior to sealing for shipment, check the list of samples against the container contents to verify the presence of each sample listed on the chain of custody.

8. Secure chest lid with shipping tape by covering the entire seal with tape. Complete information on the custody seal and affix the custody seal over the taped seal.

9. Transport the shipping container directly to the laboratory, the laboratory courier, or to the overnight carrier for overnight delivery. Once a core has been opened, sediment samples will be shipped by close of the following day. Rinsate blank samples will also be shipped by close of the following day with the appropriate SDG.

4.5 SAMPLE TRACKING

From the time of collection through transportation, the handling of samples will follow chain of custody procedures. Completed and signed Individual Core Collection Forms will be provided by the samplers to the Sample Processing Area personnel when relinquishing the collected cores for sample processing. The Sample Processing Area personnel will sign the Individual Core Collection Form accepting custody of the cores.

A sample is considered under the sampler's custody if one or more of the criteria are met:

- sample is in the sampler's possession;
- sample is in the sampler's view after being in sampler's possession;
- sample was in the sampler's possession and then locked up to prevent tampering; or
- sample is in a designated secure area.

Samples collected for analysis will be continuously tracked in the Sample Processing Area and while in transit to the laboratory by use of the following procedures below. The Sample Processing Area will be secured (locked) with limited access.

- Individual sample bottles will be properly labeled and securely sealed before being placed in the container for shipment to the laboratory.

- Pertinent information will be entered on the chain of custody form in the field (see attached chain of custody form and form key). Assignment of the SDG number, the matrix spike/matrix spike duplicate (MS/MSD) assignments, and the analyses requested for each sample will be made on both the SDG Tracking Log (see attached SDG Tracking Form) and the chain of custody form.

- The chain of custody form must include the following, as required by guidance in SW-846, Test Methods for Evaluating Solid Waste (USEPA, Third Edition, including Promulgated Update I, 1993, Chapter One): 1) project name; 2) signatures of samplers; 3) sample number, date and time of collection, and grab or composite sample designation; 4) signatures of individuals involved in sample transfer; and 5) if applicable, the air bill or other shipping number.

- The completed chain of custody form will be signed, dated, enclosed in a sealable

plastic bag with a copy of the SDG Tracking Log and placed in the container prior to shipment. A copy of both documents will be retained by field personnel and stored in a dedicated binder. Additional copies will be distributed as follows:

- a copy will be faxed to the FC or the FC's designee;
- a copy will be faxed to the data validator; and
- a copy will be faxed to the lab manager/client service representative at each laboratory being used.

- Samples will be considered in the sampler's custody while in his/her possession or within sight, or locked in a secure area prior to shipment. If the person packing the container and verifying the sample list is different than the sampler, both the sampler and the packer will sign the chain of custody form.

- Upon receipt at the laboratory, the designated laboratory sample custodian shall sign the chain of custody form indicating receipt of the incoming field samples. The samples shall be checked against the chain of custody form upon arrival at the laboratory. The receiving personnel will enter all arriving samples into a laboratory logbook. Any discrepancies between the samples and the chain of custody form(s), or any evidence of tampering with the shipping container or the custody seal will be immediately reported to the FC. The sample custodian will immediately check the temperature of the cooler upon arrival at the laboratory and record the measured temperature on the chain of custody form and in a laboratory logbook.

- A copy of the chain of custody form shall be distributed to the following individuals on the day of sample receipt:

  - a copy will be faxed to the FC or the FC's designee;
  - a copy will be faxed to the data validator; and
  - a copy will be faxed to the field office.

  The original shall be retained by the Laboratory's sample custodian.

5.0 DOCUMENTATION

5.1 FIELD NOTES

Documentation of sample handling activities will be conducted in accordance with SOP No. 1 – Field Documentation. The following information should also be included in the logbook (at a minimum):

- sample IDs collected on that day;
- brief synopsis of types of equipment and methods used in collecting the samples; and
- details regarding the field adjustment of preservatives, if necessary.

5.2 CHAIN OF CUSTODY DOCUMENTATION

Samples will be tracked through chain of custody documentation as described in Section 4.5 of this procedure.

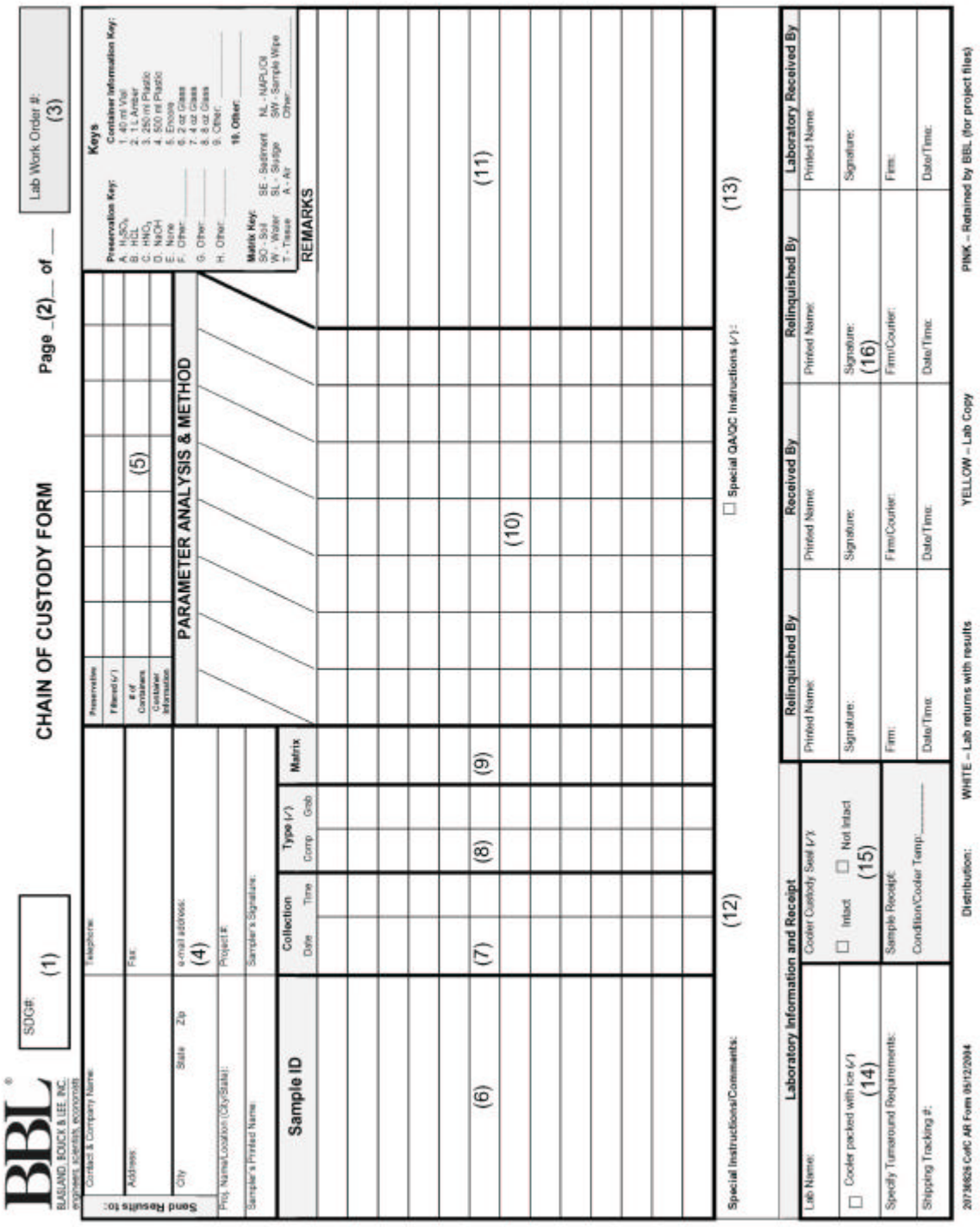
PREPRINTED SAMPLE LABEL

	PROJECT #: (1) PROJECT NAME: Newark Bay Phase I SI Program
SDG #: (2)	
SAMPLE #: (3)	GEOMORPHIC AREA (4)
DATE SAMPLE COLLECTED: (5)	TIME SAMPLE COLLECTED: (6)
LABORATORY: (7)	
SAMPLE MATRIX: (8)	
ANALYSES REQUIRED: (9)	
PRESERVATIVE: (10)	
SAMPLER: (11)	
REMARKS: (12)	

Key:

(1) Company-specific project number, if appropriate
(2) SDG Number
(3) Sample Number (e.g., NB01SED030B-02)
(4) Geomorphic area (e.g., Transitional Slopes)
(5) Date sample was collected from the core (e.g., 1/1/2005)
(6) Time sample was collected from the core (EST)
(7) Laboratory used for analyses
(8) Sample matrix type (e.g., water, sediment)
(9) Analyses required for sample
(10) Preservative(s) used on sample (pre-preserved by the lab)
(11) Sampler name
(12) Remarks pertinent to proposed analyses

CHAIN OF CUSTODY FORM



CHAIN OF CUSTODY FORM KEY

(1) SDG Number (as described in Section 4.2.2 of this SOP) (e.g., NB1003).

(2) Page number and total number of pages for the set of chain of custody form submitted with the samples for analysis.

(3) Analytical laboratory's internal work order number (to be completed by analytical laboratory).

(4) Address where the analytical results are to be sent, project identifiers (location and internal project numbers) and sampler's signature.

(5) Preservation methods and bottles.

(6) Sample ID (e.g., NB01SED03B-03); refer to Section 4.2.1 of this SOP for sample and QA sample IDs.

(7) Date and time (EST) of sample collection.

(8) Check if sample was a composite or grab sample.

(9) Sample matrix (e.g., sediment, water).

(10) Provide analysis and method for which sample is being submitted. Check the appropriate box for which analyses the sample is being submitted.

(11) Provide any pertinent comments regarding the sediment sample submitted for analyses (e.g., not enough sample volume for full analyses).

(12) Provide any special instructions to the analytical laboratory.

(13) Provide any special QA/QC instructions to the analytical laboratory.

(14) Provide details regarding the cooler shipment (analytical laboratory name, whether the cooler was packed with ice, turnaround requirements, and shipping tracking number).

(15) Provide details as to receipt of cooler (to be completed by analytical laboratory on receipt). Indicate if the chain of custody seal was intact and the cooler temperature upon receipt.

(16) Signatures for custody to be completed by sampler and analytical laboratory.

SDG TRACKING LOG

SDG Number _____(1)_____ **SDG Open Date** _____(3)_____
Sample Matrix _____(2)_____ **SDG Close Date** _____(4)_____

Sample #	Sample ID	MS/MSD	Comments
1	(5)	(6)	(7)
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Rinsate Blank	(8)	N/A	(9)

Notes:

1. The SDG must not exceed 20 field samples. Rinsate Blanks do not count towards the sample total. Check which of the 20 samples have been collected to include extra volume for MS/MSD and assign as such.
2. 3x the weights listed should be collected for lab QC (i.e., MS/MSD/internal lab duplicate).
3. Field duplicate is a separate sample, not to be confused with "internal lab duplicate."

SDG TRACKING LOG KEY

(1) SDG number (as described in Section 4.2.2 of this SOP) (e.g., NB1003).

(2) Matrix of samples in this SDG (e.g., sediment).

(3) Date first sample in SDG is collected.

(4) Date last sample in SDG is collected (not to exceed seven days beyond the open date entered in Line 3; described in Section 6.7 of the IWP).

(5) Sample ID (e.g., NB01SED030B-03).

(6) Check if a MS or MSD analysis should be performed on this sample. If a MS or MSD is to be performed, note in the "Comments" column which analysis the MS/MSD should be performed for. If the sample is not to be analyzed for a MS/MSD, then leave blank.

(7) Provide any pertinent comments regarding the sediment samples submitted for analyses (e.g., "MS for Herbicide").

(8) Rinsate blank ID as described in Section 4.2.3 of this SOP (e.g., NB1003RB).

(9) Provide any pertinent comments regarding the rinsate blank submitted for analyses.